Validating a Modified Version of the Self-Directed Learning Readiness Scale (MSDLR) for use Among Undergraduate Students

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Abstract

Self-directed learning readiness (SDLR) refers to the degree to which learners are ready to be accountable for their own learning and learning needs and is a skill that students can develop. Understanding student levels of SDLR can help optimize the learning environment for more effective teaching and learning strategies. The purpose of this study was to provide additional validity evidence for a modified version of the SDLR scale. Evidence of internal structure and relations with other variables was examined in a sample of 203 undergraduate students. A confirmatory factor analysis did not support the three-factor structure of the modified SLDR scale; however, a follow-up exploratory factor analysis suggested that there were three factors, with some items not loading onto their intended factors. Evidence was provided for convergent validity, and mixed evidence was found for discriminant validity. Overall, these results suggest that some modifications may be needed for this scale, but there is potential for this measure to be suitable for assessing readiness for self-directed learning.

Keywords: self-directed learning readiness, undergraduate students, validity

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"There is no end to education. It is not that you read a book, pass an examination, and finish with education. The whole of life, from the moment you are born to the moment you die, is a process of learning."

– Jiddu Krishnamurti

Learning is a life-long and active process in which learners need to be accountable for their own learning goals and needs, a process referred to as self-directed learning (Abd-El-Fattah, 2010; Fisher et al., 2001; Knowles, 1978). Strong self-directed learners can identify and set their own learning goals, develop approaches to meet these goals, implement learning strategies, and assess how well they have achieved their goals. However, not everyone is able to manage their own learning effectively in this way. Self-directed learning *readiness* (SDLR) refers to the degree to which learners are ready to be accountable for their own learning and learning needs (Fisher et al., 2001). A person's level of SDLR is impacted by their abilities, attitudes, and personality traits, but it is also a skill that can be improved through experience and practice with autonomous learning activities (Fisher et al., 2001). Furthermore, it is considered an important student outcome from a university education (Klunklin et al., 2010) and has been linked to better academic performance (Abd-El-Fattah, 2010; Rashid & Asghar, 2016; Reio, 2004) and life-long learning tendencies (Tekkol & Demirel, 2018). Thus, accurately assessing SDLR in undergraduate students can help optimize the learning environment for more effective teaching and learning strategies to give students the support they need to succeed.

One scale that has been developed to measure SDLR is the Self-Directed Learning Readiness Scale (Fisher et al., 2001). This scale assesses three dimensions of SDLR: self-management, desire to learn, and self-control. Self-management refers to one's ability to engage in effective time management and manage one's learning goals and tasks. Desire for learning refers to having an interest in the process of learning. Self-control refers to one's perception of how much control they have over their learning and the learning process. Currently the factor analysis results for this scale have been mixed: Some studies supported the intended three-factor solution (Fisher et al., 2001; Fisher & King, 2009) and others found a four-factor solution (Hendry & Ginns, 2009; Williams & Brown, 2013).

Additionally, the SDLR scale was initially developed within nursing education; Justus and colleagues (in press) sought to shorten and adapt this scale to be more relevant to a general undergraduate student population. They reduced the scale from 42 items to 27 items and modified the wording of 7 items. To provide validity evidence for this modified tool—referred to as the MSDLR scale—the authors conducted a reliability analysis and a factor analysis which supported the three dimensions of SDLR intended with the original scale. However, a need for additional validity evidence to support this modified version of the tool within an undergraduate student sample is required.

In keeping with the Standards for Educational and Psychological Testing (American Educational Research Association [AERA] et al., 2014), validity evidence is important for assessing the evidence to support of use of test scores for their intended uses. Validation is an ongoing and cumulative process in which five sources of validity evidence (i.e., test content, response processes, internal structure, relationships with other variables, and test consequences; AERA et al., 2014) can be integrated into an overall evaluation of the quality and suitability of the proposed interpretations and uses of test scores (Kane, 2006). Specifically, in this study, we first examined the internal structure of the MSDLR scale by seeking to confirm its three-factor structure and reliability as found by Justus and colleagues (in press). Next, we explored evidence based on relations to other variables by examining the associations between the MSDLR scale and four theoretically relevant variables: impulse control (Neal & Carey, 2005), goal setting (Neal & Carey, 2005), general self-efficacy (Chen et al., 2001), and social desirability (Strahan & Gerbasi, 1972). To provide evidence of convergent validity, we hypothesized that

(1) impulse control would be at least moderately and positively correlated with the self-control and self-management subscales of the MSDLR,

(2) goal setting would be at least moderately and positively correlated with all three dimensions of the MSDLR scale and would have the strongest correlation to the self-management subscale, and

(3) general self-efficacy would be at least moderately and positively correlated with all three subscales of the MSDLR scale.

To provide evidence of discriminant validity, we hypothesized that

(4) social desirability would be uncorrelated with all three dimensions of the MSDLR scale, and

(5) impulse control would have a weak correlation with the desire for learning subscale of the MSDLR.

Methods

Participants

Participants were recruited through the psychology research pool of a small Canadian university. Two hundred thirty-eight participants completed the study, and thirty-five individuals were removed due to poor data. A total sample of 203 participants were included in the analysis. There were 175 (86%) females, and 28 (14%) males with the mean age of 22.73 ($SD = 5.01$). Students spanned between various years of their programs with 41 first-year students (20%), 56 second-year students (28%), 55 third-year students (27%), 41 fourth-year students (20%), and 10 fifth-year or greater students (5%). The majority of students were within the psychology program (63%), other students came from arts (16%), sciences (5%), business (4%), general studies (4%), and health sciences or nursing (3%). Nine students did not specify their program (4%). The participants were mainly comprised of South Asian people (42%), White people (29%), and East Asian people (11%). The remaining 37 participants were of various other ethnicities; of those that selected "Other", 8 were recoded into the appropriate ethnicity categories, and 6 participants preferred not to answer.

Materials

Modified Self-directed Learning Readiness Scale (MSDLR Scale)

The MSDLR scale is a 27-item scale developed by Justus and colleagues (in press). The scale includes three subscales: self-management (SM) with 10 items ($\alpha = .91$), self-control (SC) with 9 items ($\alpha = .81$), and desire for learning (DL) with 8 items ($\alpha = .81$). Responses were on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Scores were calculated by taking the mean for each subscale, and a high score on each subscale indicated a high level of competency for that skill.

Self-Regulation Questionnaire (SSRQ)

The SSRQ (Neal & Carey, 2005) is a 21-item questionnaire with two subscales: impulse control (IC) and goal setting (GS). The SSRQ-IC subscale consists of 11 items that measure impulsivity and self-control ($\alpha = .77$). The SSRQ-GS subscale consists of 10 items that measure

the ability to set goals (α = .87). Participants responded to each item on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Scores were calculated by taking the mean for each subscale, and a high score on each subscale indicated a high level of competency for that skill. One additional item in the SSRQ-IC was reverse scored based on our statistical and grammatical findings rather than the recommendations of Neal and Carey (2005).

New General Self-Efficacy (NGSE) Scale

Created by Chen and colleagues (2001), the NGSE measures an individual's general self-efficacy (α = .89). The scale consists of 8 items on a Likert response ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Scores were calculated by taking the mean of all scores, and a high score indicated a higher general self-efficacy.

New Social Desirability Scale

The New Social Desirability Scale (Strahan & Gerbasi, 1972) is a condensed version of the Marlowe-Crowne Social Desirability Scale. It includes two forms: M-C 1(10) and M-C 2(10), both consisting of 10 items. Only the M-C 1(10) was used in the current study (α = .60). Ten additional questions were created as controls within the M-C 1(10) to conceal the social desirability items to promote truthful responses. Participants answered true or false to each item. Five of the items (false responses) were reversed code to indicate a socially desirable response. Scores were calculated by summing the items, and a high score indicated that the participant responded in a socially desirable manner.

Procedure

Participants completed the study online through Qualtrics (www.qualtrics.com). They first provided electronic consent, and then were presented with a demographic questionnaire followed by a battery of counterbalanced measures (MSDLR scale, SSRQ, NGSE, and New Social Desirability Scale). Finally, eligible participants received bonus credit towards their courses for their participation in the study.

Results

First, a factor analysis and reliability analysis were conducted on the MSDLR scale to assess the internal structure. Finally, the MSDLR was correlated to other theoretically relevant variables to examine the evidence from relationships with other variables. Reliability analysis was conducted in R version 3.6.2 (R Core Team, 2019) with the *userfriendlyscience* package

(Peters, 2018a), and all other analyses were conducted in Jamovi Version 1.2 (The Jamovi Project, 2020).

Internal Structure

A confirmatory factor analysis (CFA) was conducted in Jamovi to confirm the three-factor structure of the MSDLR. Model fit was assessed using chi-square, the root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR), the comparative fit index (CFI), and the Tucker-Lewis index (TLI). Acceptable model fit was deemed to be achieved if the chi-square was nonsignificant, RMSEA was ≤ .08 (≤ .05 is ideal), SRMR was ≤ .08 (≤ .05 is ideal), and CFI and TLI were ≥ .90 (≥ .95 is ideal; Anunciação, 2018; Hu & Bentler 1999; Yu, 2002). At least three of the five fit statistics needed to indicate acceptable model fit for the model to be accepted.

Of the five model fit statistics, only two indicated acceptable model fit (χ^2 (321, n = 203) = 601, p < .001; RMSEA = .07; SRMR = .07; CFI = .88; TLI = .87). In addition, six items showed insufficient loading onto their predicted factor (see Table 1). Because of this, an exploratory factor analysis (EFA) was conducted with the principal axis extraction method and an oblimin rotation. The number of factors was determined based on statistical fit (assessed with a chi-square, RMSEA, and TLI, where at least two of the three were needed to indicate acceptable fit) and parallel analysis. Of the three model fit indices, only one indicated acceptable model fit (χ^2 (273, n = 203) = 601, p < .001; RMSEA = .06; TLI = .89). However, the parallel analysis and the scree plot indicated three factors. In addition, three distinct factors were present based on the factor loadings, but two of the items failed to load, one item loaded to the incorrect factor, and two items cross-loaded into two factors (see Table 2).

A reliability analysis was conducted in R to establish the internal consistency within each subscale. Internal consistency reliability is considered ideal when the reliability coefficient is .80 or higher, .70 is acceptable, and below .70 is not recommended (Dunn et al., 2014; Furr & Bacharach, 2014). McDonald's ω was calculated for each subscale as it allows for the approximation of reliability without violating the assumptions of Cronbach's α (Dunn et al., 2014; Peters, 2018b). The Self-Management subscale (ω = .92, 95% CI [0.90, 0.93]) showed ideal internal consistency, and the Desire to Learn (ω = .81, 95% CI [.77, .85]) and Self-Control (ω = .81, 95% CI [.77, .85]) subscales showed acceptable to ideal internal consistency.

Correlations with Other Measures

To examine convergent and discriminant validity evidence, each of the three subscales of the SDLR (self-management, desire to learn, and self-control) were correlated to other theoretically relevant variables (see Table 3). Correlations were determined to be large (> .50), medium (.30 - .49), or small (.10 - .29) based on the criteria established by Cohen (1992) and are presented in Table 3. As hypothesized, (1) impulse control, as measured from the SSRQ-IC, had a large positive correlation with self-management and a medium positive correlation with self-control; (2) goal setting, as measured from the SSRQ-GS, had the strongest positive correlation with self-management, followed by self-control and desire to learn; and (3) self-efficacy, as measured from the NGSE, had a strong positive correlation with all three subscales, providing evidence of convergent validity. In addition, as hypothesized, (4) social desirability, as measured from the M-C 1(10), had small correlations with all subscales, providing evidence of discriminant validity. However, contrary to the hypothesis, (5) impulse control had a moderate correlation with desire for learning.

Discussion

The purpose of this study was to validate the MSDLR scale by investigating the internal structure and its relationship with related variables. First, a CFA was used to examine the three-factor model. The CFA showed concerns with some of the factor loadings, and as a result, did not support the proposed three-factor model MSDLR. One potential reason for this is that the items were provided to participants in the order of their intended factors rather than the order provided by Justus et al. (in press). To further explore the internal structure of the MSDLR, we ran an EFA: The scale had some low cross-loadings, and three items failed to load into their intended factors (see Table 2). By observing the fit indices, only the RMSEA demonstrated acceptable fit into three factors with the parallel analysis and scree plot also suggested three factors. To resolve the questionable results, it could be appropriate that a larger sample might correct this issue of numbers being less than acceptable (e.g., RMSEA; Kenny et al., 2015), but removing or adjusting items that do not make the cut-off may be a better option as the CFI and TLI are not as impacted by sample size (Ainur et al., 2017). Therefore, in a follow-up study, changes to the MSDLR may be necessary by increasing sample size and removing possibly questionable items.

Evidence of convergent validity was found for all three subscales of the MSDLR. First, the SSRQ-IC showed a strong correlation with the SM subscale and a medium correlation with

the SC and DL subscales of the MSDLR. These correlations promote the idea that students would need some form of control with their ability to prepare to learn, potentially to control and manage the urge to procrastinate. Next, the SSRQ-GS subscale had a medium correlation with all subscales of the MSDLR with the strongest relationship with SM and supporting that the MSDLR has forms of goal setting and self-management within the scale. Lastly, the general self-efficacy correlated with all three subscales which promotes the sense that the MSDLR examines students' ability to efficiently manage their action with regard to the learning environment. Overall, the evidence supports that the MSDLR has convergent validity.

With the discriminant validity, only one out of two of our hypotheses was supported. The Marlowe-Crowne social desirability scale had weak or no correlation with any of the subscales of the MSDLR, indicating that the MSDLR does not measure social desirability. However, there is an issue with the social desirability scale: it had very poor reliability ($\alpha = .60$). This is not abnormal because the social desirability has shown in past research similar reliability (Reynolds, 1982; Strahan & Gerbasi, 1972); however, it was examined by Reynolds (1982) that the scale correlated highly with the standard social desirability, suggesting it still useable. Yet, it is concerning for this study since the poor reliability might have impacted the results of the correlation. It would be advised to accept these results with a grain of salt. On the other hand, the SSRQ-IC scale was predicted to have a weak or no correlation at all with the DL subscale, yet the results indicated a moderate relationship between them. This indicates that there may be some form of impulse control within desire to learn. This makes sense because students' desire to learn can be related to their ability to have the control to stay on task. The discriminant evidence is not strongly supported, and future research on discriminant validity for the MSDLR is required.

This study contained some limitations. First, most of the sample was collected from one department, which limits the generalizability of the scale to other departments. Second, the scale needs more evidence of discriminant validity. Third, the MSDLR is a self-report measure, meaning the results could vary based on different participants. Lastly, the study was conducted at one university.

In the end, a reliable measure to examine students' ability to direct themselves in learning is important in higher education as it could provide users the chance to investigate their own readiness in certain settings (e.g., psychology, mathematics, or anthropology; Fisher et al.,

2001). Unlike the scale developed by Fisher and colleagues designated for nursing, the main purpose of the MSDLR is to be accessible in any field, and with the current concerns of COVID-19 influencing students' learning, the MSDLR can provided students, educators, and institutions with a tool to gauge readiness for online classes. Therefore, based on the current evidence from this study, the MDSLR can be a viable tool to use in higher education with skepticism until discriminant validity is further supported.

Tables

Table 1

Factor Loadings for the Confirmatory Factor Analysis of the MSDLR Subscales

Factor	Item	Factor loadings
Self-Management	I am self-disciplined.	.79
	I am able to plan my own learning.	.78
	I am efficient in my learning.	.81
	I am systematic in my learning.	.76
	I can be trusted to pursue my own learning.	.79
	I am organized.	.77
	I like to direct the course of my learning.	.67
	I prioritize my work.	.69
	I manage my time well.	1.01
	I set specific times for my study.	.72
Desire for Learning	I like to critically evaluate new ideas.	.60
	I enjoy learning new information.	.54
	I learn from my mistakes.	.37
	I enjoy studying.	.67
	I enjoy a challenge.	.65
	I like to gather the facts before I make a decision.	.38
	I am open to new ideas.	.36
	I have a need to learn.	.64
Self-Control	I have high personal standards.	.51
	I take responsibility for my own decisions/actions.	.39
	I can find out information for myself.	.40
	I evaluate my own performance.	.51
	I am in control of my life.	.63
	I am aware of my own limitations.	.39
	I am able to focus on a problem.	.58
	I prefer to set my own goals.	.47
	I like to make decisions for myself.	.39

Table 2

Factor Loadings for the Exploratory Factor Analysis of the MSDLR Scale

Item	Factor 1	Factor 2	Factor 3
Self-Management Subscale			
I am self-disciplined.	**.74**	-.13	.14
I am able to plan my own learning.	**.72**	.03	.08
I am efficient in my learning.	**.79**	-.05	.06
I am systematic in my learning.	**.74**	.07	-.05
I can be trusted to pursue my own learning.	**.76**	-.05	.10
I am organized.	**.78**	.02	-.14
I like to direct the course of my learning.	**.51**	-.06	.32
I prioritize my work.	**.60**	.14	-.02
I manage my time well.	**.85**	.02	-.03
I set specific times for my study.	**.57**	.25	-.23
Desire to Learn Subscale			
I like to critically evaluate new ideas.	.19	**.48**	.10
I enjoy learning new information.	-.03	**.77**	.02
I learn from my mistakes.	.08	.24	**.30**
I enjoy studying.	.14	**.50**	-.08
I enjoy a challenge.	.07	**.64**	-.02
I like to gather the facts before I make a decision.	.05	**.30**	.28
I am open to new ideas.	-.12	**.52**	.21
I have a need to learn.	-.05	**.81**	.02
I have high personal standards.	.24	**.34**	.10
Self-Control Subscale			
I take responsibility for my own decisions/actions.	-.04	.19	**.62**
I can find out information for myself.	.05	.17	**.40**
I evaluate my own performance.	.16	.26	**.29**
I am in control of my life.	.26	.22	**.32**
I am aware of my own limitations.	.11	.14	**.37**
I am able to focus on a problem.	**.37**	.25	.24
I prefer to set my own goals.	.34	-.01	**.46**
I like to make decisions for myself.	.11	-.02	**.52**

Table 3

Intercorrelations, Means, and Standard Deviations for All Scales

Scale	Mean	SD	**SM**	**DL**	**SC**	IC	GS	NGSE	SD
Self-Management	3.67	0.82	–						
Desire to Learn	3.85	0.59	.45	–					
Self-Control	4.19	0.52	.62	.59	–				
Impulse Control	3.48	0.60	.55	.43	.49	–			
Goal Setting	3.69	0.67	.69	.45	.66	.57	–		
Self-Efficacy	3.90	0.67	.62	.60	.58	.48	.61	–	
Social Desirability	13.6	1.50	-.20	-.02	-.15	.03	-.11	-.20	–

Note. Boldfaced subscales are from the MSDLR. *SM* = Self-Management subscale; *DL* = Desire for Learning subscale; *SC* = Self-Control subscale; *IC* = Impulse Control subscale; *GS* = Goal Setting subscale; *NGSE* = New General Self-Efficacy scale; *SD* = Social Desirability scale.

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